REDESCRIPTION OF *BARILIUS MESOPOTAMICUS* BERG, 1932
A POORLY KNOWN CYPRINID FISH FROM THE TIGRIS-EUPHRATES BASIN

by

Brian W. COAD (1) and Friedhelm KRUPP (2)

ABSTRACT.– The cyprinid fish *Barilius mesopotamicus* Berg, 1932 based on a single specimen, is redescribed from 259 specimens from Turkey, Syria, Iraq and Iran. This species is endemic to the present Tigris-Euphrates basin but is also found in a probable Pleistocene tributary of this basin, the Dalaki River of Iran, since cut off by the post-Pleistocene rise in sea level. An aberrant population is described from a Euphrates tributary in Iraq.

RÉSUMÉ.– *Barilius mesopotamicus* Berg, 1932, poisson de la famille des Cyprinidae, avait été décrit d'après un seul spécimen. Une nouvelle description est donnée, fondée sur 259 specimens provenant de la Turquie, la Syrie, l'Iran et l'Iraq. Cette espèce est endémique du bassin de l'Euphrate et du Tigre, mais on la trouve aussi dans le Dalaki en Iran, qui est probablement un affluent pléistocène de ce bassin, isolé depuis par une montée post-pléistocène du niveau de la mer. Une population aberrante d'un affluent de l'Euphrate en Iraq est décrite.

Barilius mesopotamicus was briefly described by Berg (1932) from a single specimen collected in 1914. The type locality was given as « (Siaret) Seid-Hassan, an der persisch-türkischen Grenze, unter 33° 20' n. Br., 46° 20' ö. L. Seid-Hassan liegt am Flusse Gawi, welcher sich mit dem Kundschian (Gundschian)-tschai vereinigt ; der letztere mündet in den Tigris ». Seyyed Hasan (33° 06' N, 46° 11' E) lies on a tributary of the Kanjan Cham River near the Iranian town of Mehran on the Iran-Iraq border. This tributary is presumably the Gawi River, although it is not named on maps available to us nor does it appear in gazetteers. Berg (1949) recorded a second specimen with 9 branched dorsal fin rays from Mendeli (= Mandali at 33° 45' N, 45° 32' E in Iraq, not 33° 42' N as given by Berg) which lies on the Ab Rayan, known as the Gangir River in Iran. Beckman (1962) briefly described this species from the Euphrates River in Syria and differed from Berg in stating that pharyngeal teeth are in three, not two, rows and that the lateral line may be complete. Apart from these two points, the description did not add to Berg's original work. Al-Rawi *et al.* (1978) recorded this species from the Little

(1) Ichthology Section, National Museum of Natural Sciences, Ottawa, Ontario, Canada. K1A OM8.

(2) Institut für Zoologie, Johannes Gutenberg-Universität Mainz, Saarstr. 21, 6500 Mainz, R.F.A.

Cybium, 1983, 7 (1) : 47-56.

Zab River (Nahr az-Zab as-Saghir) basin in Iraq without a description. Other records and descriptions of this species have apparently been taken from Berg's original description and from Beckman's brief description (e.g. Khalaf, 1961 ; Mahdi, 1962 ; Kähsbauer, 1963 ; Mahdi and Georg, 1969 ; Al-Nasiri and Hoda, 1976 ; see also comments in Banister, 1980).

The purpose of this redescription is to give a more detailed account of the species and to record its distribution in southwest Asia.

Materials and methods

Specimens examined are listed below. Original locality data are cited. Data in parentheses are interpretations of original data.

Abbreviations : – MMC = National Museum of Natural Sciences, Ottawa, Canada ; BM (NH) = British Museum (Natural History), London, England ; SMF = Senckenberg Museum, Frankfurt, F.R. Germany ; ISBB = Institutul de Stiinte Biologice, Bucuresti, Roumanie ; SL = standard length.

Iran

NMC 79-0120, 3, 19.3-50.7 mm SL, Bushehr, Dalaki River near Konar Takhteh, 29° 28' N, 51° 21' E, 20 October 1976, B.W. Coad, S. Coad, K. Evans and J. Halpern.

NMC 79-0357, 1, 27.6 mm SL, Khuzestan, irrigation ditch in Karkheh River drainage, 3 km from Susangerd, 31° 34' N, 48° 12' E, 26 January 1978, B.W. Coad and S. Coad.

NMC 79-0363, 11, 21.4-30.2 mm SL, Khuzestan, Karkheh River, 80 km north of Ahvaz, 31° 52' N, 48° 20' E, 27 January 1978, B.W. Coad and S. Coad.

NMC 79-0365, 7, 20.0-34.4 mm SL, Khuzestan, Doveyrich River drainage, 32° 25' N, 47° 36.5' E, 28 January 1978, B.W. Coad and S. Coad.

NMC 79-0367, 1, 34,2 mm SL, Khuzestan, Meymeh River, 11 km north of Dehloran, 32° 44.5' N, 47° 09.5' E, 28 January 1978, B.W. Coad and S. Coad.

NMC 79-0368, 29, 21.6-41.9 mm SL, Khuzestan, Karkheh River, 32° 24.5' N, 48° 09' E, 28 January 1978, B.W. Coad and S. Coad.

NMC 79-0372, 2, 30.7-33.1 mm SL, Khuzestan, Dez River near Chogha Zanbil, ca. 32° 02' N, 48° 30' E, 29 January 1978, B.W. Coad and S. Coad.

NMC 79-0377, 3, 28.0-39.4 mm SL, Khuzestan, Karkheh River, 88 km north of Andimeshk, ca. 32° 57' N, 47° 50' E, 29 January 1978, B.W. Coad and S. Coad.

NMC 79-0378, 7, 31.9-42.4 mm SL, Khuzestan, stream tributary to Karkheh River, ca. 32° 48' N, 48° 04' E, 29 January 1978, B.W. Coad and S. Coad.

NMC 79-0379, 21, 23.8-46.0 mm SL, Khuzestan, Dez River, 32° 12' N, 48° 27' E, 30 January 1978, B.W. Coad and S. Coad.

NMC 79-0380, 10, 25.3-41.0 mm SL, Khuzestan, stream tributary to Dez River, ca. 32° 10' N, 48° 35' E, 30 January 1978, B.W. Coad and S. Coad.

NMC 79-0381, 7, 24.3-31.2 mm SL, Khuzestan, stream west of Shushtar, ca. 32° 10' N, 48° 35'E, 30 January 1978, B.W. Coad and S. Coad.

NMC 79-0382, 4, 25.9-30.8 mm SL, Khuzestan, Karun River at Shushtar, 32° 03' N, 48° 51' E, 30 January 1978, B.W. Coad and S. Coad.

NMC 79-0383, 8, 28.6-34.8 mm SL, Khuzestan, Ab-e Shur drainage, 31° 59.5' N, 49° 06' E, 30 January 1978, B.W. Coad and S. Coad.

NMC 79-0384, 3, 26.8-40.8 mm SL, Khuzestan, Ab-e Shur drainage, 32° 00' N, 49° 07' E, 30 January 1978, B.W. Coad and S. Coad.

NMC 79-0392, 3, 35.0-39.3 mm SL, Khuzestan, Zard River, 25 km north of Ramhormoz, ca. 31° 32' N, 49° 48' E, 31 January 1978, B.W. Coad and S. Coad.

NMC 79-0396, 35, 25.1-48.8 mm SL, Khuzestan, Kheyrabad River, 20 km from Behbehan, 30°

32' N, 50° 23.5' E, 1 February 1978, B.W. Coad and S. Coad.
ISSB unregistered, 1, 48.7 mm SL, Hablerud River, Gulf drainage, near Borazjan, (probably Helleh River, ca. 29° 20' N, 51° 15' E), 28 May 1976, P. Bianco and S. Zerunian.

Iraq
BM(NH) 1974.2.22. : 1256-1266, 11, 33.7-46.2 mm SL, stream between Habaniyah and Euphrates (town or Hawr (= lake al-Habbaniyah and Nahr al-Furat), ca. 33° 22' N, 43° 34' E), 25 September 1957.

Syria
BM(NH) 1968.12.13 : 221-236, 16, 30.8-42.4 mm SL, Tigris River at Ain Divar (Nahr Dijlah at Ain Diwar), 37° 17' N, 42° 11' E, 17 November 1958, W.C. Beckman.
BM(NH) 1968.12.13 : 217-220, 4, 18.5-47.4 mm SL, Euphrates River at Mayadine (Nahr al-Furat at al-Mayadin), 35° 01' N, 40° 27' E, 20 November 1958, W.C. Beckman.
SMF 16442, 5, 28.2-35.9 mm SL, Nahr al-Balikh at Jisr Shannin (Nahr Balikh at Jisr Shanine), 36° 03' N, 39° 06' E, 16 March 1979, R. Kinzelbach and F. Krupp.
SMF 16443, 63, 17.0-34.9 mm SL, Nahr al-Balikh at Jisr Shannin (Nahr Balikh at Jisr Shanine), 36° 03' N, 39° 06' E, 19 August 1980, F. Krupp and W. Schneider.

Turkey
ISBB unregistered, 4, 32.8-34.4 mm SL, Batman Suyu, tributary to the upper Tigris, near Diyarbakir, ca. 37° 55' N, 40° 15', E.A. Kelle.

The above list summarizes the distribution of this species in southwest Asia based on material examined. Additional localities are those cited in the introduction for L.S. Berg's two specimens which are in the Academy of Sciences, Leningrad, U.S.S.R. (Armantrout, 1980), and records for the drainage of the Little Zab River in Iraq (Al-Rawi *et al.*, 1978) which are given below after interpretation :

Al-Tabla, 20 km before Rania (Raniyah), on the highway between Kala Diza (Qal'at Dizah) and Rania (Raniyah) (ca. 36° 12' N, 44° 59' E).
Dokan (Dukan) Lake, Dokan (Dukan) Nahiya (35° 57' N, 44° 57' E).
Kirkuk Province, Altun Kupri (35° 45' N, 44° 09' E).

Counts and measurements follow Hubbs and Lagler (1958). Dorsal, anal, pectoral and pelvic fin ray counts are separated into unbranched, including rudimentary rays (Roman numerals), and branched rays with the last two rays in the dorsal and anal fins counted as one (Arabic numerals). Gill raker counts are for the whole, anterior, first arch. Vertebral counts include the hypural plate as one vertebra and the four Weberian vertebrae.

Results

Meristic data.

Meristic data are summarized in Table I. There are no significant differences between males and females for meristic characters. However significant differences are found in seven out of twelve characters examined for a comparison of a limited sample of ten females from the Habbaniyah stream.

Table I. – Meristic data for 30 males, 30 females and 10 Habbaniyah stream females. x = mean, SD = standard deviation. Probability values (p) are given using t-tests for comparison of males with females and for comparison of the two female samples.

Dorsal fin branched rays	7	8	9	x	SD	p
Males	-	27	3	8.1	0.31	⟩0.05
Females	2	25	3	8.0	0.41	⟩0.05
Habbaniyah females	1	9	-	7.9	0.32	

Anal fin branched rays	10	11	12	13	14	x	SD	p
Males	3	13	13	-	1	11.4	0.82	⟩0.05
Females	1	15	13	1	-	11.5	0.63	⟩0.05
Habbaniyah females	-	8	1	1	-	11.3	0.67	

Pectoral fin branched rays	11	12	13	14	x	SD	p
Males	3	9	17	1	12.5	0.73	⟩0.5
Females	4	6	20	-	12.5	0.73	⟨0.001
Habbaniyah females	6	4	-	-	11.4	0.52	

Pelvic fin branched rays	6	7	8	x	SD	p
Males	1	28	1	7.0	0.26	⟩0.05
Females	1	28	1	7.0	0.26	⟩0.05
Habbaniyah females	-	10	-	7.0	0.00	

Lateral line scales	42	43	44	45	46	47	48	49	50	51	52	53	54	55	x	SD	p
Males	1	3	-	1	6	4	3	3	3	3	1	1	1	-	47.8	3.02	⟩0.05
Females	-	-	3	1	4	4	-	4	8	2	3	-	-	1	48.6	2.74	⟨0.02⟩0.01
Habbaniyah females	-	-	-	-	-	1	1	1	-	2	2	1	1	1	51.2	2.57	

Scales above lateral line	8	9	10	11	x	SD	p
Males	10	16	3	1	8.8	0.75	⟩0.05
Females	13	15	2	-	8.6	0.61	⟩0.05
Habbaniyah females	5	5	-	-	8.5	0.53	

Scales below lateral line	2	3	4	x	SD	p
Males	10	19	1	2.7	0.53	⟩0.05
Females	13	17	-	2.6	0.50	⟨0.01⟩0.001
Habbaniyah females	-	9	1	3.1	0.32	

Scales between lateral line and pelvic fin	1	2	3	x	SD	p
Males	1	20	9	2.3	0.52	⟩0.05
Females	3	15	12	2.3	0.65	⟩0.05
Habbaniyah females	1	7	2	2.1	0.57	

Scales around caudal peduncle	15	16	17	18	19	20	x	SD	p
Males	2	17	7	4	-	-	16.4	0.82	⟩0.05
Females	-	20	6	2	1	1	16.6	1.01	⟨0.01⟩0.001
Habbaniyah females	4	6	-	-			15.6	0.52	

Total gill rakers	7	8	9	10	11	12	13	14	x	SD	p
Males	2	6	8	7	5	1	-	1	9.5	1.53	⟩0.05
Females	2	5	10	8	4	-	1	-	9.4	1.30	⟨0.01⟩0.001
Habbaniyah females	3	4	3	-	-	-	-	-	8.0	0.82	

Flank spots	6	7	8	9	10	11	x	SD	p
Males	1	6	10	7	5	1	8.4	1.19	>0.05
Females	1	5	11	8	4	1	8.4	1.13	
Habbaniyah females	-	-	-	-	-	-	-	-	

Total vertebrae	38	39	40	41	x	SD	p
Males*	-	8	11	1	39.7	0.59	>0.05
Females*	-	5	12	3	39.9	0.64	$<0.02 >0.01$
Habbaniyah females	2	4	4	-	39.2	0.79	

* n = 20.

Modal values are dorsal rays III/8, anal rays III/11, pectoral rays I/13, pelvic rays I/7, scales above lateral line 9, scales below lateral line 3, scales between lateral line and pelvic fin 2, scales around caudal peduncle 16, total gill rakers 9, flank spots 8, and total vertebrae 40. Counts of lateral line scales do not show strong modes.

Morphometric data.

Morphometric data are summarized in Table II. Seventeen characters are examined and there are five differences between males and females. Again the Habbaniysh stream females are quite distinct from females taken over a wide range for the species, eleven differences out of seventeen.

Scale characters.

Scale counts are summarized in Table I. The size at which the lateral line is fully developed is variable. It is usually complete in specimens over 30 mm SL. A specimen of 27.3 mm SL was the smallest one with a complete lateral line. The specimens from the Batman Suyu, Turkey, differ from other populations by having a larger number of scales in the lateral line (51-58, mean = 54.5). On the body the lateral line is decurved and parallel to the ventral body profile from the pelvic fin origin to the caudal peduncle, being 2-3 scales above this profile. On the caudal peduncle the lateral line is below the mid-line, but the scales on the caudal fin posterior to the hypural plate are perforated in the mid line. There is an evident pectoral fin axillary scale and a smaller pelvic fin axillary scale. Scales are regularly arranged over the whole body but are not strongly imbricate, particularly on the belly and on the back anterior to the dorsal fin. The scales are deciduous. Anterior flank scales are oval with a subcentral anterior focus and a moderate number of circuli. Radii are found principally on the posterior and lateral fields. Anterior field radii are usually absent although one or two radii may occasionally be found. Scale radii based on five anterior flank scales from each of five fish (40.7-50.7 mm SL) : number 5-11 (mean 7.8) primary radii, 0-13 (mean 5.9) secondary radii, and 5-23 (mean 6.8) total radii.

Table II. – Morphometric data for 30 males, 30 females and 10 Habbaniyah stream females. Abrevations and comparisons as in Table I except range is given in parentheses, $P_1 - P_2$ = distance between origins of paired fins, and $P_2 - A$ = distance between pelvic fin origin and anal fin origin.

Character	Males		Females		Habbaniyah females
SL (mm)	28.2 - 48.8 x SD	p	27.3 - 50.7 x SD	p	33.6 - 46.7 x SD
Standard length (SL) Head length (HL)	3.9 0.17 (3.6-4.3)	> 0.05	3.9 0.20 (3.6-4.3)	< 0.001	4.3 0.19 (3.9-4.6)
SL Head depth	6.0 0.30 (4.9-6.4)	> 0.05	6.0 0.23 (5.5-6.5)	< 0.01 > 0.001	6.3 0.28 (5.7-6.7)
SL Body depth	5.3 0.39 (4.5-6.0)	> 0.05	5.4 0.39 (4.8-6.2)	> 0.05	5.6 0.25 (5.0-5.8)
SL Predorsal length	1.7 0.04 (1.6-1.8)	> 0.05	1.7 0.05 (1.6-1.8)	< 0.001	1.8 0.08 (1.6-1.8)
HL Head width	2.3 0.08 (2.1-2.4)	> 0.05	2.3 0.10 (2.0-2.5)	< 0.001	2.1 0.09 (2.0-2.3)
HL Snout length	3.7 0.19 (3.4-4.0)	< 0.05 > 0.02	3.8 0.19 (3.4-4.3)	< 0.001	4.2 0.16 (3.9-4.3)
HL Orbit width	3.1 0.16 (2.9-3.5)	< 0.05 > 0.02	3.2 0.17 (2.8-3.5)	< 0.001	2.9 0.13 (2.8-3.2)
HL Interorbital width	3.4 0.17 (3.1-3.8)	< 0.05 > 0.02	3.5 0.18 (3.1-3.8)	> 0.05	3.5 0.14 (3.4-3.7)
HL Postorbital length	2.3 0.13 (2.0-2.5)	> 0.05	2.3 0.11 (2.1-2.5)	> 0.05	2.3 0.05 (2.2-2.4)
HL Pectoral fin length (P_1)	1.2 0.05 (1.1-1.3)	> 0.05	1.2 0.06 (1.1-1.4)	> 0.05	1.2 0.07 (1.1-1.3)
HL Pelvic fin length (P_2)	1.8 0.08 (1.7-2.0)	< 0.001	1.9 0.08 (1.7-2.0)	< 0.001	1.7 0.09 (1.5-1.8)
HL Longest branched dorsal fin ray	*1.5 0.12 (1.3-1.7)	< 0.01 > 0.001	1.6 0.14 (1.3-1.8)	< 0.001	**1.4 0.06 (1.3-1.5)
HL Longest branched anal fin ray	1.7 0.11 (1.5-2.0)	> 0.05	1.7 0.12 (1.5-1.9)	> 0.05	1.7 0.11 (1.5-1.9)
HL Barbel length	3.6 0.87 (2.7-7.2)	> 0.05	3.5 0.92 (2.6-7.8)		-
Caudal peduncle length Caudal peduncle depth	2.2 0.22 (1.8-2.6)	> 0.05	2.3 0.21 (1.9-2.7)	< 0.001	2.7 0.16 (2.5-3.0)

$\frac{P_1\ P_2}{P_1}$	1.1 0.08 (0.9-1.3)	⟩ 0.05	1.1 0.07 (1.0-1.3)	⟨ 0.001	1.3 0.08 (1.2-1.4)
$\frac{P_2 - A}{P_2}$	1.2 0.09 (0.9-1.3)	⟩ 0.05	1.2 0.08 (1.1-1.5)	⟨0,01 ⟩0.001	1.1 0.12 (0.9-1.3)

* n = 29
** n = 9

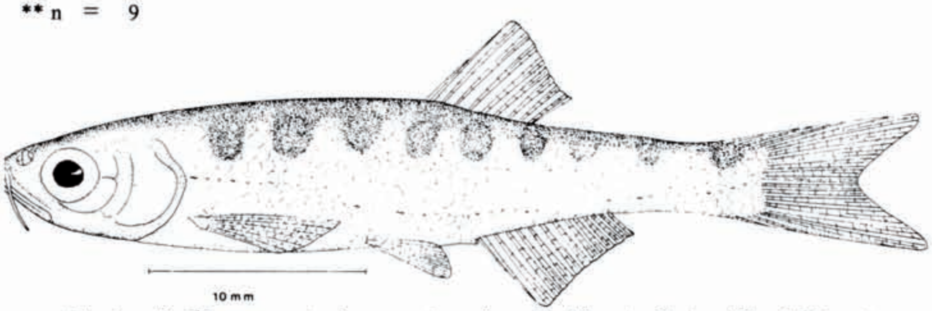

Fig. 1. – ***Barilius mesopotamicus***, specimen from Jisr Shannin, Syria, (SL = 35.9 mm)

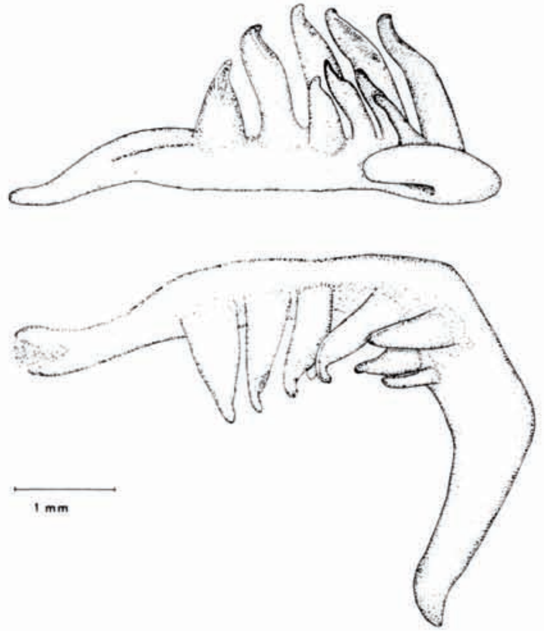

Fig. 2. – Left pharyngeal bone and teeth of ***Barilius mesopotamicus***

Gut characters.

Gill raker counts are summarized in Table I. Gill rakers are short and rounded. Pharyngeal teeth are hooked at their tips and are in two rows (Fig. 2). Pharyngeal tooth counts are 4,5-5,4 (14) and 4,5-5,3 (5) or more rarely in three rows 1,3,5-5,3,1 (1). Beckman (1962) reported a count of 1,4,5-5,4,1. The peritoneum is light

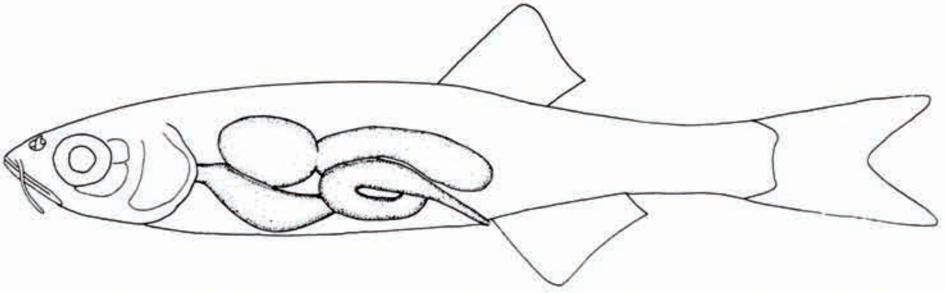

Fig. 3. – ***Barilius mesopotamicus***, position and shape of the gut and the swim bladder

to silvery but bears scattered melanophores which give a greyish tinge in preserved specimens when expanded. The gut is a simple S-shape (Fig. 3).

Pigmentation.

The flanks, belly and suborbital bones are silvery in life. Alcohol preserved specimens are silvery to yellowish but the silvery colouration is lost in formalin preserved specimens. The most conspicuous pigmentation in preserved specimens is a series of brown flank spots following the upper body profile. These are weakly expressed or absent in the Habbaniyah stream females. The number of flank spots is summarized in Table I. A median dorsal stripe is variably developed. Fins are lightly pigmented, most pigment being on the fin rays, not the fin membranes. The anal and paired fins are almost entirely hyaline. The caudal fin may show one or two irregular grey stripes running parallel to the posterior margin.

Other characters.

General body shape may be seen in Fig. 1. There is a small symphysial knob on the lower jaw. The mouth is slightly subterminal, oblique and elongate ; the rictus lies below the anterior half of the eye. A well developed barbel has its origin just anterior to the level of the nostril above the upper lip and lies in a groove between the upper lip and the beginning of the suborbital bone series. This barbel is absent or minute in the Habbaniyah stream females. In addition to the maxillary barbels, a second pair of barbels having their origin slightly above the posterior edge of the mouth, are present in 8 out of 259 specimens. These are usually rudimentary but may reach 10.7 % of the head length. The suborbital bones are large. The dorsal fin origin lies about mid-way between the pelvic and anal fin origins. The caudal fin is moderately forked and the margins of the dorsal and anal fins are slightly concave.

Habitat and diet.

Barilius mesopotamicus is found in small streams only a metre wide, irrigation ditches and larger flowing waters including major rivers more than 200 m wide.

Current in these waters varies from slow to fast but generally an obvious flow is apparent. All these waters are at low altitude on the mesopotamian plain and no specimens were collected in streams and rivers of the Zagros mountains. Collections were made over mud and pebble substrates in shallow streams or at river margins. The species may occur in mid-river in surface waters. Temperatures at various times of capture ranged from 12-24°C and conductivity from 0.45-10.5 millimhos. The Nahr al-Balikh dries up completely in summer unlike the other habitats sampled. In August hundreds of small *B. mesopotamicus* were found in small pools of less than 20 cm depth which remained in the dry river bed. The salinity is usually high in these small mesopotamian rivers. In March when the river was still flowing, the following values were taken : $Cl^- = 390$ mg/l and salinity 1.5 ‰. The complete stomach contents of 10 specimens were examined. They consisted entirely of terrestrial arthropods of the following taxa : Arachnidae ; Coleoptera ; Heteroptera ; Thysanoptera ; Diptera : Culicidae, Brachycera ; Hymenoptera.

Distribution.

Barilius mesopotamicus is endemic to the Tigris-Euphrates basin in Syria, Iraq, Iran and Turkey. It does not appear to be common in Turkey, at least in the upper reaches of this basin (Kuru, 1971). Its known distribution is summarized by the list of material examined. One population from the Dalaki River in Iran is outside the modern Tigris-Euphrates basin. However this distribution is presumably a relict of the late Pleistocene when the Tigris-Euphrates flowed down a drained Gulf receiving tributaries now isolated by the post-Pleistocene rise in sea level (Banister and Clarke, 1977).

Discussion

Howes (1980) has suggested that *B. mesopotamicus* is related to *Leucaspius* and should not be retained in *Barilius*. This statement is apparently based on osteological evidence but detailed reasoning has not yet been published and critical comment cannot be made. For the present it seems best to retain the species in *Barilius*. Its relationship to *Barilius* species of Africa and India has not been investigated.

The most unsual feature of this re-description is the discovery of what can only be termed an « aberrant » population in the Habbaniyah stream. The sample is small and nothing is known about the environmental conditions under which the sample was caught. Populations to the north-west and to the south-east are not dissimilar from each other. Maps indicate that the Habbaniyah stream is not isolated from the Tigris-Euphrates basin.

Accordingly these specimens are identified as *B. mesopotamicus* for the present but further examination of material from the Habbaniyah area should be undertaken to delimit the distribution, variation and continued existence of this population.

The population from Dalaki river in Iran, although isolated from populations in the Tigris-Euphrates basin, is not notably different from these other populations.

Acknowledgements. – We are indebted to the Research Council of Pahlavi (now Shiraz) University, Shiraz, Iran for funding of collection trips on which the Iranian specimens were caught (research grants 35-A5-149-172 and 37-AS-251-238) and would also like to acknowledge the invaluable help of drivers and field assistants who cheerfully aided in capture of specimens under a variety of environmental conditions : S. Coad, K. Evans, J. Halpern and A. Shirazi.

The loan of the British Museum specimens was made through the courtesy of Alwyne Wheeler and we are grateful to Petru M. Banarescu for the loan of specimens from the Institute of Biology in Bucharest.

REFERENCES

AL-NASIRI, S.K. & S.M.S. HODA, 1976. – A guide to the freshwater fishes of Iraq. *Basrah Nat. Hist. Mus. Publ.*, 1 : XII + 124 p.

AL-RAWI, A.H., S. AL-OBAIDI & S.Z. JAWDAT, 1978. – A list of fishes collected from the Little Zab River in Iraq. 1. *Bull. Biol. Res. Centre*, Baghdad, 10 : 3-11.

ARMANTROUT, N.B., 1980. – The freshwater fishes of Iran. Ph. D. Thesis, Oregon State University, Corvallis, Oregon. XX + 472 p.

BANISTER, K.E., 1980. – The fishes of the Tigris and Euphrates rivers, p. 95-108. In: RZÓSKA, J. (Ed.). Euphrates and Tigris, Mesopotamian Ecology and Destiny, *Monog. Biol.*, 38 : X + 122 p.

BANISTER, K.E. & M.A. CLARKE, 1977. – The freshwater fishes of the Arabian Peninsula. *J. Oman Studies*, 1977 : 111-154, 1 map.

BECKMAN, W.C., 1962. – The freshwater fishes of Syria and their general biology and management. *FAO Fish. Biol. Tech. Paper,* 8 : V + 297 p.

BERG, L.S., 1932. – Eine neue *Barilius*-Art (Pisces, Cyprinidae) aus Mesopotamien. *Zool. Anz.*, 100 : 332-334.

– 1949. – Presnovodnye ryby Irana i sopredelnych stran. *Trudy Zool. Inst. Akad. Nauk SSSR*, 8 : 783-858.

HOWES, G.J., 1980. – The anatomy, phylogeny and classification of bariliine cyprinid fishes. *Bull. Br. Mus. nat. Hist.* (Zool.), 37 (3): 129-198.

HUBBS, C.L. & K.F. LAGLER, 1958. – Fishes of the Great Lakes Region. The University of Michigan Press, Ann Arbor. XV + 213 p., 44 pl.

KÄHSBAUER, P., 1963. – Zur Kenntnis der Ichthyofauna von Iran. *Ann. Nat. Mus. Wien,* 66 : 317-355.

KHALAF, K.T., 1961. – The marine and freshwater fishes of Iraq. Baghdad. 164 p.

KURU, M., 1971. – The fresh-water fish fauna of eastern Anatolia. *Istanbul Üniv. Fen Fak. Mecm.*, Seri B, 36 (3-4): 137-147.

MAHDI, N., 1962. – Fishes of Iraq. Ministry of Education, Baghdad. 82 p.

MAHDI N. & P.V. GEORG. – A systematic list of the vertebrates of Iraq. *Iraq Nat. Hist. Mus. Publ.*, 26 : 104 p.